

**REMARKS/ARGUMENTS**

This reply is fully responsive to the Office Action dated 24 MARCH 2006, and is filed within six - (6) months following the mailing date of the Office Action. The

- 5 Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed. The method of payment and fees for petition fee due in connection therewith is enclosed.

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**Disclosure/Claims Status Summary:**

This application has been carefully reviewed in light of the Office Action of March 24, 2006, wherein:

- 15 A. The numbering of the previously amended claims was objected to as failing to comply with 37 CFR 1.126 because the previously amended claims did not preserve the original numbering of the claims throughout the prosecution. The miss-numbering of the previously amended claims has been renumbered on the official record, and the Applicants were advised that the Applicants do not need to file any amendments in this
- 20 regard;
- B. Claims 2-6 and 8-16 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement;
- C. Claims 1, 2, 4-8, and 11-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Leung-I et al. US Patent Number 5,198,677, in view of Kaufman, US
- 25 Patent Number 4,481,062, and in further view of Leung-II et al.;
- D. Claims 3 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Leung-I et al. US Patent Number 5,198,677, in view of Kaufman, US Patent Number 4,481,062 and Leung-II et al. US Patent Number 5,587,226, and in further view of Anderson et al., US Patent Number 5,365,070; and
- 30 E. Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Leung-I et al. US Patent Number 5,198,677, in view of Kaufman, Kaufman, US Patent Number

4,481,062, and Leung-II et al. US Patent Number 5,587,226, and in further view of Mantei et al., U.S. Patent No. 4,483,737.

**Claims Numbering Objections**

5 In the first section of the Office Action, the Examiner stated that the numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. The Examiner further stated that when claims are canceled, the remaining claims must not be renumbered, and that when new claims are presented, they must be numbered consecutively beginning with the number  
10 next following the highest numbered claims previously presented (whether entered or not).

In particular, the Examiner stated that the mis-numbered claims that were presented in Applicants' amendment filed on Jan. 3, 2006 have been renumbered by the Examiner as  
15 follows: newly added Claim 2 has been renumbered as Claim 15; newly added Claim 9 has been renumbered as Claim 16; mis-numbered Claims 3-8 have been renumbered as Claims 2-7 (i.e. they have been returned to their original numbering); mis-numbered Claims 10-16 have been renumbered as Claims 8-14 (i.e., they have been returned to their original numbering); the dependency of correctly renumbered Claims 2-6 and 8-14 have  
20 been changed to reflect the corrected numbering. The Examiner further stated that for example, the correctly numbered Claim 2 is now dependent on Claim 15, the correctly renumbered Claim 3 is dependent on Claim 2, correctly renumbered Claim 8 is dependent on Claim 16, and correctly renumbered Claim 9 is dependent on Claim 8. The Examiner noted the described above have already been entered into the official record and that the  
25 Applicants do not need to file any amendments in this regard. In addition, the Examiner stated that in all future correspondence, the Applicants should use the corrected claim numbering.

**Regarding Numbering of Claims 1-16**

The Applicants thank the Examiner for pointing out the discrepancies on the numbering of the amended claims previously submitted by the Applicants, and for entering the corrected claim numbering into the official record.

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Furthermore, with respect to the Examiner's statement that "correctly numbered Claim 2 is now dependent on Claim 15, (emphasis added) correctly renumbered Claim 3 is dependent on Claim 2, correctly renumbered Claim 8 is dependent on Claim 16, and (emphasis added) correctly renumbered Claim 9 is dependent on Claim 8," the

10 Applicants refer the Examiner to the previously amended claims submitted with the office action response dated January 3, 2006, where Claims 2-6 depend directly from the previously added Claim 15 (previously mis-numbered as Claim 2, and corrected by the Examiner as current Claim 15), and where Claims 8-14 depend directly from the previously added Claim 16 (previously mis-numbered as Claim 9, and corrected by the  
15 Examiner as current Claim 16). Therefore, the Applicants submit that the correctly numbered Claim 3 is dependent on the correctly numbered Claim 15, and that Claim 3 is not dependent on Claim 2 as previously stated by the Examiner. Likewise, the Applicants submit that the correctly numbered Claim 4 is dependent on the correctly numbered Claim 15, the correctly numbered Claim 5 is dependent on the correctly numbered Claim  
20 15, and the correctly numbered Claim 6 is dependent on the correctly numbered Claim 15.

In addition, the Applicants submit that the correctly numbered Claim 9 is dependent on the correctly numbered Claim 16, and that Claim 9 is not dependent on Claim 8 as  
25 previously stated by the Examiner. Likewise, the Applicants submit that the correctly numbered Claim 10 is dependent on the correctly numbered Claim 16, the correctly numbered Claim 11 is dependent on the correctly numbered Claim 16, Claim 12 is dependent on the correctly numbered Claim 16, the correctly numbered Claim 13 is dependent on the correctly numbered Claim 16, and the correctly numbered Claim 14 is  
30 dependent on the correctly numbered Claim 16.

The Applicant notes that a newly proposed list of claims containing corrections to the dependency of Claims 2-6 and 8-14 has been provided above to satisfy the claim numbering requirements in accordance with 37 CFR 1.126, and to clarify the correct  
5 claim numbering as suggested by the Examiner, and that these corrections to the dependencies of Claims 2-6 and 8-14 do not affect the scope of the claims. Furthermore, the newly proposed list of claims follows the dependencies of the original claims submitted with the original patent application.

10 The Applicant believes that with the aforementioned discussion regarding the numbering and dependency of Claims 2-6 and 8-14, no ambiguities remain regarding this particular objection. Furthermore, pursuant to the Examiners' suggestions, the Applicants have made the remaining aforementioned corrections to the numbering of the claims. Because these corrections are made to satisfy the correct numbering of the claims in accordance  
15 with 37 CFR 1.126, they are not made for "statutory" reasons.

Therefore, the Applicants respectfully request that the Examiner please enter to the official record the correct claim dependencies and numbering listed above as a replacement for the original set of claims submitted with the patent application. The  
20 Applicants believe this new set of listed claims reflect the correct claim numbering previously entered by the Examiner, and the correct claim dependencies previously submitted by the Applicants.

**Claim Rejections - 35 U.S.C. § 112, first paragraph**

25 In the second section of the Office Action, the Examiner rejected Claims 2-6 and 8-16 under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement, and as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed  
30 invention.

**Claims 15 and 16**

Specifically, the Examiner stated that in the newly added Claims 15 and 16, the phrase, “wherein the container is positioned in the path of the oxygen plasma”  
5 does not appear to be supported by the specification as originally filed.

**Regarding the rejections of Claims 15 and 16 as containing subject matter not described in the specification**

The Applicants submit that support for new Claims 15 and 16 can be found on pages 3-10  
10 of the specification, and in Figures 1, 2, and 5 (referring to element 130 in Figures 1, 2, and 5). Specifically, the Applicants submit that Figures 1 and 2 clearly illustrate “a container for placing at least one diamond sample (referring to element 130 on Figures 1 and 2), wherein said at least one diamond sample has a surface, and wherein the container (referring to unlabeled container below element 130 in Figures 1 and 2) is positioned in  
15 the path of the oxygen plasma (referring to element 204 in Figure 2) exiting through the plasma source exit (element 102 in Figures 1 and 2),” as recited on Claims 15 and 16.

Furthermore, the Applicants submit that the present invention teaches that the diamond sample, or samples, of interest are placed beyond the plasma source exit (referring to  
20 present invention page 6 lines 18-19), which is equivalent to “the container for placing at least one diamond sample (claimed in Claims 15 and 16) being positioned in the path of the oxygen plasma exiting through the plasma source exit.” The Applicants further refer the Examiner to the present invention page 8 lines 3-4 where the present invention recites that “the low energy electrons aid in the dissociation of the molecular oxygen ions into atomic  
25 ions before the plasma leaves the plasma source as a plume (referring to element 204 in Figure 2) on its way to the diamond surface(s) (referring to element 130 in Figure 2).” Moreover, the Applicants refer the Examiner to the present invention page 8 lines 19-21, where the specification states that “with appropriate positioning from the plasma source exit (referring to element 124 in Figures 1 and 2), the diamond surface(s) (referring to  
30 element 130 in Figures 1 and 2) may be completely covered by the atomic oxygen plasma

plume (referring to element 204 in Figure 2).” Therefore, the Applicants submit that the present invention clearly emphasizes that the placement of the diamond samples must be on the way or path of the oxygen plasma plume, as recited on Claims 15 and 16.

5 In addition, the Federal Circuit stated that under 35 U.S.C. § 112, first paragraph, “The question is whether the disclosure is sufficient to enable those skilled in the art to practice the claimed invention, hence the specification need not disclose what is well known in the art.” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452 (Fed. Cir. 1984).

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Further, section 2164.01 of the MPEP sets forth the test for enablement. Citing *United States v. Telectronics, Inc.*, 857 F.2d 778, 785 (Fed. Cir. 1988), the MPEP states “[t]he test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.”

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Therefore, the Applicants submit that the present application sets forth that the invention relates to the use of plasma-enhanced chemical etching techniques for polishing a synthetic diamond to an optical quality surface (referring to the present invention page 1 lines 5-6). The Applicants further submit that one skilled in the art would understand that, in order to polish a diamond using atomic oxygen ions in plasma form as recited by the present invention, the diamond would have to be placed on the path of the atomic oxygen ions in plasma form in order for the oxygen plasma to polish the diamond. Therefore, the Applicants submit that one skilled in the art would understand that “the container must  
20 be positioned in the path of the oxygen plasma in order for the oxygen plasma to polish the diamond placed in the container” based on common sense, and on the information known in the art in conjunction with the context of the application without needing to resort to undue experimentation.

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Furthermore, the present application claims a method for rapid, uniform, and cost-effective synthetic diamond polishing, that effectively polishes synthetically produced diamonds by plasma-enhanced chemical etching using an atomic oxygen polishing plasma source, wherein said source generates high concentrations of low energy atomic oxygen ions over a large surface area (referring to the present invention page 3 lines 10-17), and because the atomic oxygen polishing plasma source generates a large plume of plasma, large diamond samples can be polished in their entirety without beam scanning, and multiple samples can be polished simultaneously (referring to page 4 lines 7-9). The Applicants submit that one skilled in the art understands that in order to polish large multiple diamond samples simultaneously, the diamond samples must be placed in the path of the large plume of oxygen plasma generated by the atomic oxygen polishing plasma source, as claimed in Claims 15 and 16.

In light of the fact that the current specification was written in a manner using concise and exact terms, well-known by any person skilled in the art of plasma-enhanced chemical etching techniques for polishing synthetic diamonds, and due to the fact that one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation, the Applicants respectfully request that the rejection of Claims 15 and 16 under the first paragraph of 35 U.S.C. § 112 be withdrawn.

**Regarding the rejections of Claims 2-6 and 8-14 under 35 U.S.C. § 112, first paragraph**

The Applicants submit that Claims 2-6 and 8-14 were rejected under 35 U.S.C. § 112 first paragraph based on their dependency on Claims 15 and 16. Therefore, the Applicants refer the Examiner to the comments above regarding Claims 15 and 16. For at least the reasons given above, the Applicants submit that Claims 15 and 16 are patentable over the cited prior art. Therefore, the Applicants submit that Claims 2-6 and 8-14 are also patentable over the cited prior art at least based on their dependence upon an allowable base claim.

**Claim Rejections - 35 U.S.C. § 103(a)**

**Examiner's rejections of Claims 1, 2, 4-8, and 11-16 under 35 U.S.C. § 103(a)**

In the third section of the Office Action, the Examiner rejected Claims 1, 2, 4-8, and  
5 11-16 under 35 U.S.C. § 103(a) as being unpatentable over Leung-I et al. (U.S. Patent  
No. 5,198,677, hereinafter referred to as the "Leung-I patent"), in view of Kaufman  
(U.S. Patent No. 4,481,062, hereinafter referred to as the "Kaufman patent"), and further  
in view of Leung II (U.S. Patent No. 5,587,226, hereinafter referred to as the "Leung-II  
patent").

10 In particular, the Examiner stated that the Leung-I patent discloses an ion source  
(referring to Figure 1) including a plasma generating chamber, magnets arranged  
around the chamber, a tungsten filament that is heated by a filament power  
source, a gas port, a bias DC power source, and an array of magnets at the exit  
15 of the chamber that act as a magnetic filter of the type claimed by the  
Applicants. The Examiner further stated that the Leung-I patent teaches that his  
magnetic filter design desirably produces a stream of mainly atomic ions, and  
that the ion source of the Leung-I patent also includes a cooling channel formed  
between a plasma generation chamber and a cylindrical wall for cooling  
20 magnets in the channel; and a liner made of a high-temperature-resistant material  
such as molybdenum provided within the chamber (referring to column 3, line  
10 through column 4, line 10). The Examiner further stated that the Leung-I  
patent uses a DC power source (referring to element 58 in Figure 1) to heat the  
tungsten filament and that the Leung-I patent does not disclose the use of an  
25 AC power source to heat his tungsten filament. Furthermore, the Examiner  
stated that the Leung-I patent does not discuss using an ion source to generate  
atomic oxygen ions.

In addition, the Examiner stated that the Kaufman patent (referring to Figure 1  
30 and column 5, lines 1-6) teaches that either an AC or DC power source can be



used to heat a tungsten filament to thermionic temperatures. Then, the Examiner concluded that it would have been prima facie obvious to one skilled in the art to modify the ion source of the Leung-I patent by substituting an AC power source for DC power source of the Leung-I patent (referring to element 58 in Figure 1), because the Kaufman patent teaches that an AC power source was known to be a functional equivalent power source for heating a tungsten filament to thermionic temperatures.

Regarding the production of atomic oxygen ions, the Examiner stated that the Leung-II patent teaches (referring to the entire patent and in particular column 13, lines 7-29, and column 15, lines 13-41) that it is desirable to produce a stream of atomic oxygen ions for materials processing, and that the Leung-II patent also teaches that a magnetic filter of the type used by the Leung-I patent will produce such a stream of atomic oxygen ions. The Examiner then concluded that it would have been obvious to one skilled in the art to use the atomic ion source of the Leung-I patent to produce the desired atomic oxygen ions by providing the ion source of the Leung-I patent with a source of oxygen as presently claimed. The Examiner further stated that the Leung-II patent also teaches (referring to column 15, lines 15-41) that his antenna ion source is more desirable for oxygen ion production than a DC discharge ion source of the type disclosed by the Leung-I patent. Then the Examiner noted that a non-preferred embodiment disclosed in the prior art can properly be used as a prior art teaching and that the use of a non-preferred embodiment would have been obvious to one willing to accept the drawbacks taught. See *In re Boe*, 148 USPQ 507; *In re Mills*, 176 USPQ 196 and *In re Susi* 169 USPQ 423.

**Regarding the rejection of Claims 1, 2, 4-8, and 11-16 over the Leung-I patent in view of the Kaufman patent and the Leung-II patent**

The Applicants submit that the present invention solves a different problem than the Leung-I, Kaufman, and Leung-II patents, and as such, the present invention should be regarded as significant and thus, non obvious. *In re Wright*, 6 USPQ 2d 1959 (1988).

The Applicants submit that, in contrast with the present invention which solves the problem of polishing diamond surfaces by generating atomic oxygen ions in plasma form, the Leung patent solves the problem of producing Nitrogen Ions from a multicusp ion beam apparatus (referring to column 1 lines 1-26) to be used in implantation applications.

5 The Applicants submit that the nitrogen ion implantation generated by the Leung-I patent is used industrially to increase the surface hardness and wear resistance of metals, which can result in a tremendous increase in the lifetime of tools (referring to column 1 lines 13-16). The Applicants further submit that "it is the primary object of the Leung-I patent to provide an ion source, which will generate an N<sup>+</sup> ion beam having a high current density  
10 and substantially improved purity so as to eliminate magnetic separation presently required and to enable direct beam use in implantation applications" (referring to column 2 lines 13-18).

Furthermore, the Applicants submit that, in contrast with the present invention which  
15 solves the problem of polishing diamond surfaces by generating atomic oxygen ions in plasma form, the Kaufman patent solves the problem of improving the plasma containment in electron-bombardment ion sources (referring to column 1 lines 7-11), which were originally developed as a means of propulsion in outer space.

20 In addition, the Applicants submit that, in contrast with the present invention which solves the problem of polishing diamond surfaces by generating atomic oxygen ions in plasma form, the Leung-II patent solves the problem of improving ion and plasma sources by producing a new improved ion and plasma source antenna, wherein the ion source is used in ion beam and neural beam accelerators, spectrometers, waste control of  
25 radioactive nuclear material, and in plasma processing (referring to column 1 lines 14-18).

Furthermore, the Applicants submit that the present invention provides a solution to an unsolved need in a crowded art and, as such, the present invention should be regarded as  
30 significant and thus, non obvious. The present invention is classified in the crowded art

of optical quality diamond polishing. Specifically the present invention relates to the use of plasma-enhanced chemical etching techniques for polishing a synthetic diamond to an optical quality surface (referring to the present invention page 1 line 10, and Claims 1, 7, 15, and 16). In the crowded art of optical quality diamond polishing there are several methods to polish diamonds to optical quality, however they require repetitive ion implantation and high ion energies, which can result in directional sputtering on the diamond's surface (referring to present invention page 2). In addition, the repeated scanning of the beam over a diamond sample is a slow and expensive process. In contrast, the present invention provides an apparatus for rapid, uniform, safe, and cost-effective synthetic diamond polishing (referring to present invention pages 3-10, Claims 1, 7, 15, and 16, Figures 1, 2, and 5) by generating high concentrations of low energy atomic oxygen ions over a large surface area. The diamond is quickly and uniformly polished by placing the diamond in the path of the oxygen plasma exiting through the plasma source exit of the invention, and by keeping the diamond in the path of the oxygen plasma until the surface of the diamond sample has optical quality smoothness. Furthermore, the oxygen plasma producing element disclosed in Claims 1 and 7 can operate at lower voltages than apparatus for ion implantation, thereby reducing both capital investment and safety concerns. Moreover, because the oxygen plasma producing element of the present invention generates a large plume of oxygen plasma, large diamond samples can be polished in their entirety without beam scanning, thus multiple samples can be polished simultaneously and quickly.

For the foregoing reasons the Applicants respectfully believe that the present invention solves a completely different problem than the prior art cited by the Examiner, and that the present invention provides a solution to an unsolved need in a crowded art, and as such, the present invention should be regarded as significant and thus, non obvious. Therefore, the Applicants respectfully request that these rejections of Claims 1, 2, 4-8, and 11-16 under 35 U.S.C. §103(a) be withdrawn.

**Regarding the rejection of Claims 2 and 8 over the Leung-I patent in view of the Kaufman patent and the Leung-II patent**

Claim 2 is dependent upon Claims 1 and 15 and Claim 8 is dependent upon Claims 7 and 16, thus the Applicants respectfully refer the Examiner to the comments above regarding  
5 Claims 1, 7, 15, and 16. As the Leung-I, Kaufman, and Leung-II patents do not teach all of the claimed limitations in Claims 1, 7, 15, and 16, the Applicants submit that, for at least the reasons given above, these Claims 2 and 8, which depend therefrom, are also allowable.

10 Furthermore, the CCPA stated that under 35 U.S.C. § 103(a), "In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification" *In re Lintner*, 458 F.2d 1013 (C.C.P.A.  
15 1972). Further, the CCPA has subsequently added that the *prima facie* case requires that the reference teachings "appear to have suggested the claimed subject matter." *In re Rinehart*, 531 F.2d 1048 (C.C.P.A. 1976). The MPEP 2143.03 further noted that, to establish a *prima facie* case of obviousness, "all the claim limitations must be taught or suggested by the prior art."

20 Therefore, the Applicants respectfully submit that that, in contrast to the present invention, the combination of the Leung-I patent with the Kaufman patent and the Leung-II patent never discloses or even suggests to form the electron source filament of iridium, as recited on Claims 2 and 8 of the present invention. Therefore, the Applicants  
25 respectfully request that the Examiner indicate exactly where, in the prior art, the Examiner is finding the suggestion to form the electron source filament of iridium.

Therefore, the Applicants submit that the combination of the Leung-I patent with the Kaufman patent and the Leung-II patent, in combination with the knowledge of one

skilled in the art, does not teach, disclose, or suggest all of the limitations of Claims 2 and 8.

For at least the foregoing reasons the Applicants respectfully submit that Claims 2 and 8,  
5 as written, are patentable over the prior art and respectfully request that this rejection of Claims 2 and 8 under 35 U.S.C. §103(a) be withdrawn.

**Regarding the rejection of Claims 4-6 and 12-14 over the Leung-I patent in view of the Kaufman patent and the Leung-II patent**

10 Claims 4-6 are dependent upon Claims 1 and 15 and Claims 12-14 are dependent upon Claims 7 and 16, thus the Applicants respectfully refer the Examiner to the comments above regarding Claims 1, 7, 15, and 16. As the Leung-I, Kaufman, and Leung-II patents do not teach all of the claimed limitations in Claims 1, 7, 15, and 16, the Applicants submit that, for at least the reasons given above, these Claims 4-6 and 12-14, which  
15 depend therefrom, are also allowable.

Furthermore, the CCPA stated that under 35 U.S.C. § 103(a), "In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art  
20 having the references before him to make the proposed substitution, combination or other modification" *In re Lintner*, 458 F.2d 1013 (C.C.P.A. 1972). Further, the CCPA has subsequently added that the prima facie case requires that the reference teachings "appear to have suggested the claimed subject matter." *In re Rinehart*, 531 F.2d 1048 (C.C.P.A. 1976). The MPEP 2143.03 further noted that, to establish a *prima facie* case of obviousness, "all the claim  
25 limitations must be taught or suggested by the prior art." Therefore, the Applicants respectfully submit that that, in contrast to the present invention, the combination of the Leung-I patent with the Kaufman patent and the Leung-II patent does not disclose or even suggest to comprise the plasma of at least 60% atomic oxygen ions; to apply a discharge voltage between the DC power source and the electron source filament that is  
30 between 50 to 150 Volts; and to introduce a pressure of oxygen gas between  $6.0 \times 10^{-5}$  and  $1.2 \times 10^{-4}$  Torr into the plasma generation reaction chamber, as recited on Claims 4-6 and

12-14 respectively. Therefore, the Applicants respectfully request that the Examiner indicate exactly where in the prior art, the Examiner is finding the suggestion to comprise the plasma of at least 60% atomic oxygen ions; to apply a discharge voltage between the DC power source and the electron source filament that is between 50 to 150 Volts; and to  
5 introduce a pressure of oxygen gas between  $6.0 \times 10^{-5}$  and  $1.2 \times 10^{-4}$  Torr into the plasma generation reaction chamber.

Therefore, the Applicants submit that the combination of the Leung-I patent with the Kaufman patent and the Leung-II patent, in combination with the knowledge of one  
10 skilled in the art, does not teach, disclose, or suggest all of the limitations of Claims 4-6 and 12-14.

For at least the foregoing reasons the Applicants respectfully submit that Claims 4-6 and 12-14, as written, are patentable over the prior art and respectfully request that this  
15 rejection of Claims 4-6 and 12-14 under 35 U.S.C. §103(a) be withdrawn.

**Examiner's rejections of Claims 3 and 9 under 35 U.S.C. § 103(a)**

In the fourth section of the Office Action, the Examiner rejected Claims 3 and 9 under 35 U.S.C. § 103(a) as being unpatentable over the Leung-I patent, in view of the  
20 Kaufman patent and the Leung-II patent for the reasons stated in the rejection of Claim 1 above, and taken in further view of Anderson (U.S. Patent No. 5,365,070, hereinafter referred to as the "Anderson patent").

In particular, the Examiner stated that the Anderson patent teaches an ion source  
25 (referring to element 10 in Figure 1) including a magnetic holding metal member (referring to element 12 in Figure 2) made of carbon steel which has high magnetic permeability so that magnetic field can easily penetrate there through (referring to column 5, line 47 through column 6, line 2). The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize

carbon steel in the construction of chamber having magnets there around so that magnetic field more efficiently penetrate there through.

**Regarding the rejection of Claims 3 and 9 over the Leung-I patent in view of the Kaufman patent and the Leung-II patent, and in further view of the Anderson patent**

Claim 3 is dependent upon Claim 15 and Claim 9 is dependent upon Claim 16, thus the Applicants respectfully refer the Examiner to the comments above regarding Claims 15 and 16. As the Leung-I, Kaufman, and Leung-II do not teach all of the claimed limitations in Claims 15 and 16, the Applicants submit that, for at least the reasons given above, these Claims 3 and 9, which depend therefrom, are also allowable. Furthermore, the Applicants respectfully note that combining the prior art of the Leung-I patent with three or more prior art references in order to reject Claims 3 and 9 is clear evidence of the non-obviousness of Claims 3 and 9. Therefore, the Applicants believe that a clear evidence of the non-obviousness of an invention is shown when a multiplicity of references, usually over three references, must be combined in order to meet the claimed invention. Thus, the Applicants submit that it is clear evidence of the non-obviousness of the present invention that a total of four references must be combined in order to meet the claimed invention recited on Claims 3 and 9. For the foregoing reasons, the Applicants respectfully believe that Claims 3 and 9, as written, are patentable over the excessive combination of prior art references and respectfully request that this rejection of Claims 3 and 9 under 35 U.S.C. §103(a) be withdrawn. Additionally, Claim 3 is dependent upon Claims 1 and 15, and Claim 9 is dependent upon Claims 7 and 16. Thus, the Applicants believe that Claims 3 and 9 are allowable, at least based on their dependency upon allowable base claims.

**Examiner's rejections of Claim 10 under 35 U.S.C. § 103(a)**

In the fifth section of the Office Action, the Examiner rejected Claim 10 under 35 U.S.C. § 103(a) as being unpatentable over the Leung-I patent, in view of the Kaufman patent and the Leung-II patent for the reasons stated in the rejection of Claim 1 above, and taken

in further view of Mantei (U.S. Patent No. 4,483,737, hereinafter referred to as the “Mantei patent”).

In particular, the Examiner stated that the Mantei patent teaches a plasma chamber (referring to element 10 in Figures 1 and 2) including a filament (referring to element 21 in Figure 1) therein and having a plurality of magnets (referring to element 14 in Figure 1) surrounding the chamber wherein the plasma chamber (referring to element 10 in Figures 1 and 2) is made of a nonmagnetic material such as stainless steel (referring to column 4, lines 29-56). The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize nonmagnetic stainless steel as a suitable material for a plasma chamber such as in the Leung-I patent.

**Regarding the rejection of Claim 10 over the Leung-I patent in view of the Kaufman patent and the Leung-II patent, and in further view of the Mantei patent**

Since Claim 10 is dependent upon Claims 7 and 16, the Applicants respectfully refer the Examiner to the comments above regarding Claims 7 and 16. As the Leung-I, Kaufman, and Leung-II patents do not teach all of the claimed limitations in Claims 7 and 16, the Applicants submit that, for at least the reasons given above, Claim 10, which depend therefrom, is also allowable.

Regarding the Examiner’s comment that “the plasma chamber (referring to element 10 in Figures 1 and 2) is made of a nonmagnetic material such as stainless steel (referring to column 4, lines 29-56),” the Applicants refer the Examiner to Claim 10 of the present invention, wherein it is clearly stated that “the non-magnetic cooling jacket is formed of stainless steel.” and wherein Claim 10 does not recite that the plasma chamber is made of stainless steel as suggested by the Examiner.

In order to emphasize the discrepancy of the previous Examiner’s comment with the claimed matter of Claim 10, the Applicants further submit that in Claim 7 it is clearly stated that “a non-magnetic cooling jacket” is formed in a substantially annular and cylindrical



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shape positioned within the “cylindrical chamber of the magnetic cylinder,” wherein the “non-magnetic cooling jacket” and the “cylindrical chamber” are two distinct elements recited in Claim 10. The Applicants further submit that the Mantei patent teaches that the chamber (referring to element 10 in Figures 1 and 2) is a nonmagnetic stainless steel vessel which is substantially cylindrical in form (referring to column 4 lines 32-33). Therefore, the Applicants strongly assert that the “plasma chamber substantially cylindrical in form” taught by the Mantei patent corresponds to the “cylindrical chamber of the magnetic cylinder” of the present invention, and thus the “plasma chamber substantially cylindrical in form” taught by the Mantei patent does not correspond with the “non-magnetic cooling jacket” formed of stainless steel, as claimed in Claim 10. For at least the reasons given above, the Applicants submit that Claim 10 is patentable over the cited prior art.

Furthermore, the Applicants respectfully note that combining the prior art of the Leung-I patent with three or more prior art references in order to reject Claim 10 is clear evidence of the non-obviousness of Claim 10. Therefore, the Applicants believe that a clear evidence of the non-obviousness of an invention is shown when a multiplicity of references, usually over three references, must be combined in order to meet the claimed invention. Thus, the Applicants submit that it is clear evidence of the non-obviousness of the present invention that a total of four references must be combined in order to meet the claimed invention recited on Claim 10. For the foregoing reasons the Applicants respectfully believe that Claim 10, as written, is patentable over the excessive combination of prior art references and respectfully request that this rejection of Claim 10 under 35 U.S.C. §103(a) be withdrawn. Additionally, Claim 10 is dependent upon Claims 7 and 16. Thus, the Applicants believe that Claim 10 is allowable, at least based on its dependency upon an allowable base claim.

#### **Dependent Claims**

Claims 2-6 are dependent upon Claims 1 and 15 and Claims 8-14 are dependent upon Claims 7 and 16. For at least the reasons given above, the Applicants submit that Claims

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1, 7, 15, and 16 are patentable over the cited prior art. Therefore, in addition to the reasons set forth above, the Applicants submit that Claims 2-6 and 8-14 are also patentable over the cited prior art at least based on their dependence upon an allowable base claim.

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**Closing Remarks:**

The Applicants respectfully submit that, in light of the above remarks, the application and all pending claims are now in allowable condition. Therefore, reconsideration is  
5 respectfully requested. Accordingly, early allowance and issuance of this application is respectfully requested.

Any claim amendments that are not specifically discussed in the above remarks are not made for patentability purposes, and it is believed that the claims would satisfy the  
10 statutory requirements for patentability without the entry of such amendments. Rather, these amendments have only been made to increase claim readability, to improve grammar, and to reduce the time and effort required of those skilled in the art to clearly understand the scope of the claim language. Furthermore, any new claims presented  
15 above are of course intended to avoid the prior art, but are not intended as replacements or substitutes of any cancelled claims. They are simply additional specific statements of inventive concepts described in the application as originally filed.

Further, it should be noted that amendment(s) to any claim is intended to comply with the requirements of the Office Action in order to elicit an early allowance, and is not  
20 intended to prejudice Applicant's rights or in any way to create an estoppel preventing Applicant from arguing allowability of the originally filed claim in further off-spring applications.

In the event the Examiner wishes to discuss any aspect of this response, or believes that a  
25 conversation with either Applicant or Applicant's representative would be beneficial, the Examiner is encouraged to contact the undersigned at the telephone number indicated below.

The Commissioner is authorized to charge any additional fees that may be required or  
30 credit overpayment to the attached credit card form. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition

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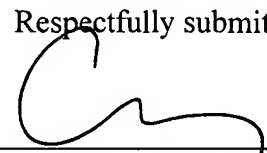
to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of  
the number of months necessary to make this response timely filed. The petition fee due  
in connection therewith may be charged to deposit account no. 50-2738 if a credit card  
form has not been included with this correspondence, or if the credit card could not be  
5 charged.

10

Date

7/24/06

Respectfully submitted,

  
Cary Tope-McKay  
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